MAY 16 1988

FEM 1.209: 390534/788

FLOOD INSURANCE STUDY

CITY OF TWINSBURG, OHIO

SUMMIT COUNTY

REVISED:

AUGUST 4, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 390534

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Coordination	1
1.3	Authority and Acknowledgements	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	2
2.3	Principal Flood Problems	4
2.4	Flood Protection Measures	4
3.0	ENGINEERING METHODS	5
3.1	Hydrologic Analyses	5
3.2	Hydraulic Analyses	6
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	6
4.1	Flood Boundaries	7
4.2	Floodways	7
5.0	INSURANCE APPLICATION	8
5.1	Reach Determinations	10
5.2	Flood Hazard Factors	10
5.3	Flood Insurance Zones	10
5.4	Flood Insurance Rate Map Description	11

TABLE OF CONTENTS (continued)

		Page
6.0	OTHER STUDIES	11
7.0	LOCATION OF DATA	13
8.0	REFERENCES AND BIBLIOGRAPHY	13
9.0	REVISIONS DESCRIPTION	15
9.1	First Revision (Revised August 4, 1988)	15
a.	Acknowledgments	15
b.	Scope	15
c.	References and Bibliography	15

FIGURES

Figure	1	-	Vicinity Map	3
Figure	2	-	Floodway Schematic	8

TABLES

Table	1	-	Summary of Discharges	5
Table	2	-	Floodway Data	9
Table	3	-	Flood Insurance Zone Data	12

EXHIBITS

Exhibit 1 - Flood Profiles

Tinkers Creek Panels 01P - 05P

Exhibit 2 - Flood Boundary and Floodway Map Index
Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY

CITY OF TWINSBURG,
SUMMIT COUNTY, OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Twinsburg, Summit County, Ohio, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the City of Twinsburg to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain management.

1.2 Coordination

Coordination of this study included notification to the City of Twinsburg of the initiation of the study by letter, and a legal notice placed in a local paper for three consecutive weeks. An initial meeting was held February 26, 1975, with the City Service Director, at which time information was gathered on the identification of flood problems, the location of high water marks, and the availability of reports and maps. A second meeting was held on December 29, 1977, and was attended by Federal Insurance Adminstration, state, city and U.S. Geological Survey (USGS) personnel, at which time it was decided which streams were to be studied in detail or by approximate methods. From time to time during the study, flood information was collected from local residents. Basic hydrologic data were transmitted to the City of Twinsburg and the Ohio Department of Natural Resources for review and comment. This report was presented to local officials and interested citizens during a public meeting.

On January 31, 1980, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Federal Insurance Administration, the Study Contractor, and the community.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1963, as amended.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey, Water Resources Division, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-8-76, Project Order No. 12. This work, which was completed in October 1978, covered all significant flooding sources affecting the incorporated areas of the City of Twinsburg.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Twinsburg. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction until December 1983.

Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the Federal Insurance Administration and the community.

The flooding source studied by detailed methods was Tinkers Creek, within the corporate limits. Approximate methods were used to study seven small tributaries within the community.

2.2 Community Description

The City of Twinsburg is a community of 11.8 square miles located approximately 19 miles southeast of Cleveland in Summit County in northeast Ohio. The community is bordered by The City of Solon and The Village of Glenwillow on the north; the unincorporated areas of Summit County on the east and south, and the City of Macedonia on the west. The city has both residential and commercial areas with the commercial development confined primarily to industrial parks. The population is 6,432 (1970 census) and will probably continue to increase in the future. The City of Twinsburg population is estimated to about 9,500 by 1980 and about 13,000 by 1990.

The climate is continental, with temperatures ranging from an average daily minimum of 40.5 degrees Fahrenheit (F.) (4.8 degrees Celsius) to an average daily maximum of 58.9 degrees (15.1 degrees Celsius) . The average annual precipitation of the study area is 35 inches (890 mm). The majority of major floods occur in late winter or early spring as the result of rain on melting snow (Reference 1).

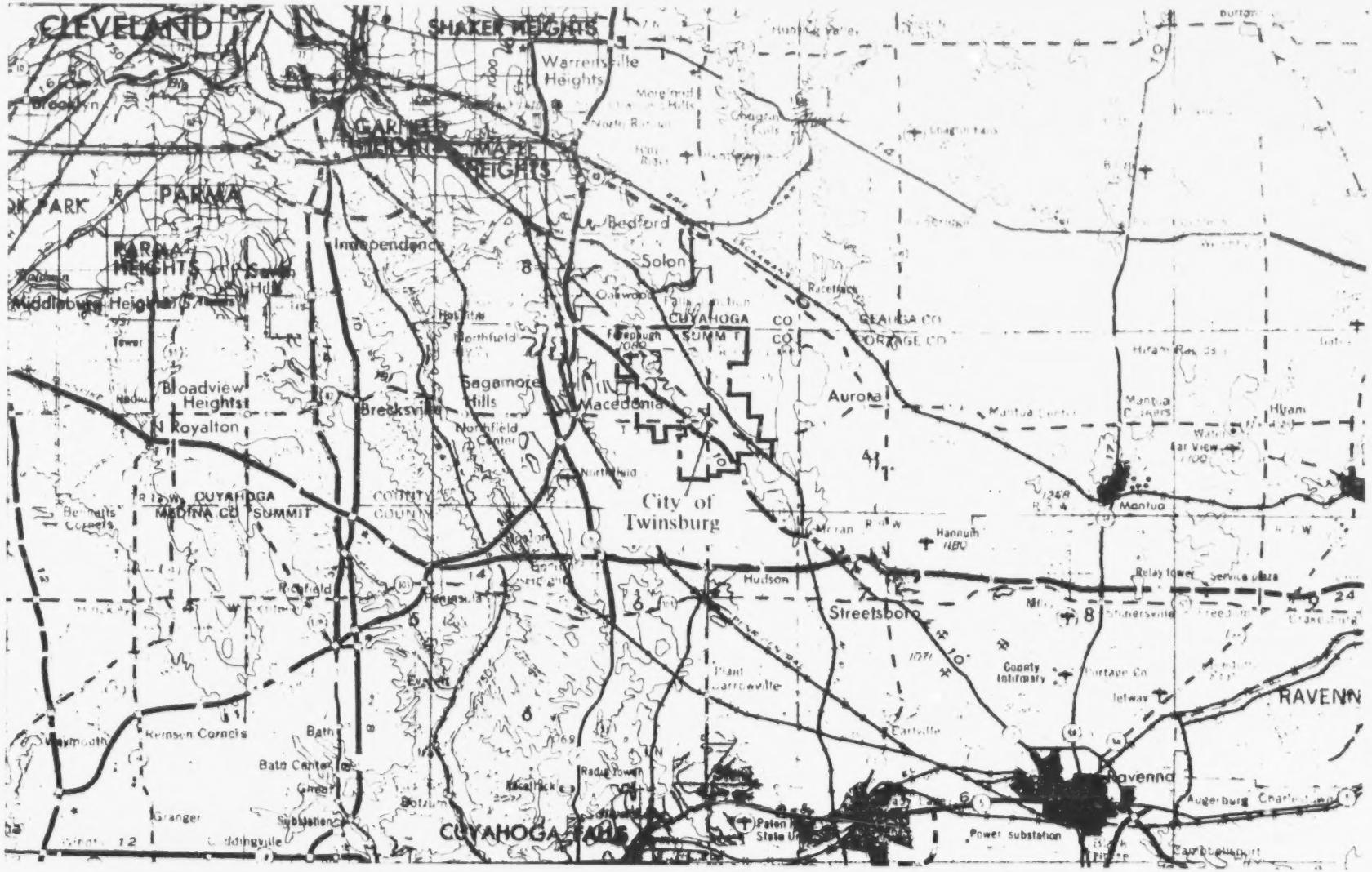


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

The terrain is rolling with relatively steep tributaries draining into Tinkers Creek. The community lies in the Glaciated Plateau which consists primarily of gently rolling uplands, broad flat valleys, and gentle hills with a sprinkling of steep sided hills. The Tinkers Creek flood plains are covered with heavy brush while the upland areas consist of crops, woods, and light brush. The principal crops of the area are corn, wheat, oats, and soybeans (Reference 2). The soils in the area are classified in the Mahoning-Ellsworth Association, which are found in gently and undulating to rolling upland areas. They are light colored, poorly to moderately well-drained of slow permeability, and wet and erodable (Reference 3).

The drainage area of the studied area of Tinkers Creek varies from 44.2 square miles at the southern city limits to 59.7 square miles at Pettibone Road. The three bridges over Tinkers Creek are at Glenwood Drive, Darrow Road (State Route 91) and Cannon Road (State Route 82). The bridge on Glenwood Drive is a modern, high, concrete deck-type bridge with an adequate waterway opening and no road overflow. The Darrow Road bridge is a modern, high, concrete deck-type bridge, but the left bank approach fill is fairly low and will overflow during large floods. The Cannon Road bridge is an old concrete beam type with large piers and an inadequate waterway opening. The left bank approach fill is low and will overflow during medium and high floods. There are no culverts on Tinkers Creek in the study reach and no major tributary streams enter this creek in the study reach. Future development of the Tinkers Creek flood plain will probably be residential and commercial. Some low, frequently flooded reaches are presently dedicated to parkways and probably will continue to be the same in the future on Tinkers Creek.

2.3 Principal Flood Problems

The low-lying areas along Tinkers Creek are annually subject to flooding. Information on past flooding was supplied by officials and local residents.

At the present time, very little development has occurred along Tinkers Creek; however, due to its proximity to the metropolitan area of Cleveland, residential development could occur in the future.

The March 1913 flood had a recurrence interval of greater than 100 years and was the greatest known flood in this area. On January 22, 1959, the most severe flood in recent years, with a recurrence interval of 100 years, occurred as the result of rain on frozen ground. The floods of July 20, 1969, and July 10, 1976, were the most recent, and the high water data for these floods provided by local residents were used in this report. These floods had recurrence inervals of 50 years and 25 years, respectively.

2.4 Flood Protection Measures

There are no permanent flood protection structures in Twinsburg and no flood control or diversion projects exist or are planned upstream at the present time.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the watersheds of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the flooding source studied in detail in the community.

The magnitude of the discharges for the different frequencies were determined primarily by methods of regional analyses outlined by Webber and Bartlett (Reference 4) and adjusted by previous studies (References 5, 4, 6, and 7) and flood-frequency techniques. The stream gaging station, Tinkers Creek at Bedford, Ohio, with a drainage area of 83.9 square miles and 14 years of record, was used as the flood peak base for this study at Twinsburg. Log-Pearson Type III flood frequency analysis methods, using seven different parameters, were used to compute the peak discharges for the 10-, 50-, 100-, and 500-year floods at Bedford. Five different regressions equations were studied (Reference 4) and the final peak discharges were selected for sites on Tinkers Creek at Pettibone Road (59.7 square miles) and at the southern city limits (44.2 square miles). The Tinkers Creek drainage areas and flood discharges used in this study are 11 percent and 29 percent, respectively, less than those used in the U.S. Army Corps of Engineers (COE) Flood Plain Information (Reference 7). These differences were discussed with the COE and the data in this report were considered the best available at the present time.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of the flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
TINKERS CREEK					
At Bedford stream gaging station	83.9	4,080	5,540	6,190	7,760
At Pettibone Road	59.7	3,090	4,330	4,860	6,200
At Twinsburg southern city limit	44.2	2,530	3,660	4,160	5,400

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along the flooding source studied in detail.

Cross section data were obtained by field survey. Cross sections were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects. All bridges were field surveyed to obtain elevation and geometric data. The field surveying was performed by the engineering Firm of Tallamy, VanKuren, Gertis and Thielman.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Roughness coefficients (Manning's n) were estimated by inspection in the field, stereo slides of the cross sections, and aerial photographs (Reference 8). Roughness coefficients ranged from 0.035 to 0.050 in the main channels and from 0.040 to 0.100 on the overbank flood plains.

Starting water-surface elevations for Tinkers Creek were determined from normal-depth elevations computed by slope-area methods. Water-surface profiles were developed for Tinkers Creek by means of the USGS step-backwater analyses program (Reference 9). Profiles were determined for the 10-, 50-, 100-, and 500-year floods and are shown in Exhibit 1.

Boundaries for the 100-year flood along the seven tributaries were determined by approximate methods, based on regional stage-frequency relations (Reference 10) and some ground surveys.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each flooding source studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using an enlarged topographic map with a contour interval of 10 feet, plus field observations and stereo slides (References 11 and 8). For streams studied by approximate methods, the boundary of the 100-year flood was developed from normal depth calculations and the topographic map referenced above.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazard in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.

The Tinkers Creek floodway recommended for this study was computed on the basis of equal conveyance reduction from each side of the flood plain, where practicable, using the 1.0-foot surcharge as a maximum. The surcharge varies from 0.8 to 1.0 foot from the downstream city limits to

Darrow Road (State Route 91). The floodway was arbitrarily increased at Darrow and Cannon Roads (State Route 82) to accommodate road overflows. Therefore, the surcharge varies from 0.6 to 1.0 foot from Darrow Road upstream to the Twinsburg city limits. The results of these computations were tabulated for selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

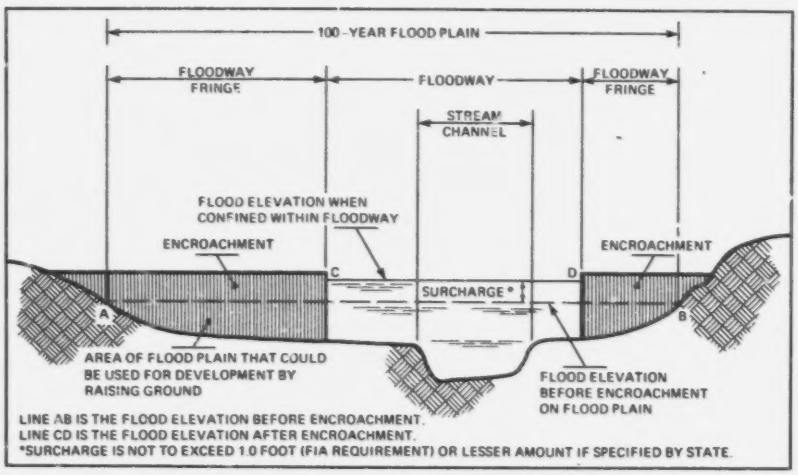

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source affecting the City of Twinsburg.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
TINKERS CREEK							
A	3500	80[2]	1080	4.5	951.3	950.3	1.0
B	6000	450	3800	1.3	952.4	951.5	0.9
C	7400	500	3300	1.4	952.8	951.9	0.9
D	8700	190	1290	3.6	953.8	952.9	0.9
E	10,500	110	1020	4.5	955.2	954.2	1.0
F	12,100	155	1400	3.3	956.9	956.0	0.9
G	16,150	515	2490	1.8	960.4	959.4	1.0
H	18,150	500	2590	1.7	962.2	961.2	1.0
I	20,780	560	2680	1.6	964.2	963.3	0.9
J	22,900	460	2420	1.8	965.7	964.7	1.0
K	24,640	165	995	4.4	968.1	967.2	0.9
L	26,860	200	1210	3.6	971.9	971.2	0.7
M	27,000	350	2270	1.9	972.1	971.4	0.7
N	29,790	340	3120	1.4	973.0	972.3	0.7
O	32,000	200	1150	3.8	973.8	973.1	0.7
P	32,130	300	2420	1.8	974.1	973.4	0.7
Q	35,070	1000	7530	0.6	974.6	974.0	0.6
R	39,380	1400	5480	0.8	975.1	974.4	0.7
S	41,130	275	1680	2.5	975.9	975.1	0.8

[1]FEET ABOVE PETTIBONE ROAD
[2]THIS WIDTH IS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

FLOODWAY DATA

TINKERS CREEK

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods.This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the City of Twinsburg are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The Flood Hazard Factor is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their Flood Hazard Factors are used to set actuarial insurance premium rate tables based on Flood Hazard Factors from 005 to 200.

The Flood Hazard Factor for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the Flood Hazard Factor is 005; if the difference is 1.4 feet, the Flood Hazard Factor is 015; if the difference is 5.0 feet, the Flood Hazard Factor is 050. When the difference between the 10-and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the Flood Hazard Factor is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the entire incorporated area of the City of Twinsburg was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or Flood Hazard Factors determined.

Zones A3, A5:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to Flood Hazard Factor.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for the flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Twinsburg is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

6.0 OTHER STUDIES

The Buffalo District COE published a Flood Plain Information report on flooding along Tinkers Creek from the Cuyahoga-Summit County line upstream to the Summit-Portage County line in April 1970 (Reference 7). There are differences between this report and the Flood Plain Information report published by the COE due to the more refined data used in this report. These differences were discussed prior to the study for this Flood Insurance Study and were agreed upon by all concerned parties. The USGS published a Flood Prone Area Map for Twinsburg, Ohio, (Reference 12). This map agrees with this Flood Insurance Study.

A Flood Hazard Boundary Map has been published by the Federal Insurance Administration (Reference 13). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
TINKERS CREEK							
REACH 1	0003	−2.3	−0.7	1.6	025	A5	VARIES–SEE MAP
REACH 2	0002,0003,0004	−1.5	−0.4	0.9	015	A3	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

FLOOD INSURANCE ZONE DATA

TINKERS CREEK

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, One North Dearborn Street, Chicago, Illinois 60602.

8.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climatological Data, Cleveland, Ohio.

2. Ohio Department of Natural Resources, Bulletin No. 27, The Groundwater Resources of Summit County, Ohio, November 1953.

3. ----------, Know Ohio's Soil Regions, 1973.

4. ----------, Division of Water, Bulletin No.45, Floods in Ohio--Magnitude and Frequency, E.E. Webber and W.P. Bartlett, Jr., 1977.

5. ----------, Division of Water, Bulletin No. 43, Floods in Ohio Magnitude and Frequency, Supplement to Bulletin No. 32, W.P. Cross and R.I. Mayo, 1969.

6. Water Data Report PJ-77-2, Water Resources Data for Ohio, Water Year 1977, Volume 2, St. Lawrence River Basin, 1977.

7. U.S. Army Corps of Engineers, Buffalo District, Flood Plain Information, Tinkers Creek Twinsburg, Summit County, Ohio, April 1970.

8. Mid-States Engineering, Indianapolis, Indiana, Photogrammetry, Maps and Base Level Lines.

9. U.S. Geological Survey, Open-File Report 76-499, Computer Application for Step-backwater and Floodway Analyses, J.O. Shearman, 1976.

10. ----------, Open-File Report, National Program for Managing Flood Losses: Guidelines for Preparation, Transmittal, and Distribution of Flood Prone Area Maps and Pamphlets, George W. Edelen, Jr., 1973.

11. ----------, 7.5 Minute Series Topographic Map, Scale 1:24000: Twinsburg, Ohio, (photorevised) 1970.

12. ----------, Map of Flood Prone Areas, Twinsburg Ohio, 1971.

13. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Twinsburg, Ohio, March 1974, (revised) June 1976.

Ohio Department Natural Resources, Division of Water, Plan Inventory Report 12a, Drainage Areas of Ohio Streams, Supplement to "Gazetter of Ohio Streams," William P. Cross, 1967.

----------, Water Plan Inventory Report 13, Hydrologic Atlas of Average Annual Precipitation, Temperature, Streamflow and Water Loss in Ohio, 1962.

Rand McNally Road Atlas, 1976.

Tallamy, Van Kuren, Gertis and Thielman, Cross Section Survey Data, Orchard Park, New York.

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the City Engineer's Office, 10075 Ravenna Road, Twinsburg, Ohio.

9.1 First Revision (Revised August 4, 1988)

a. Acknowledgments

The data for this Revisions Description were provided by the City of Twinsburg and the Ohio Department of Natural Resources. The Federal Emergency Management Agency (FEMA) reviewed and accepted these data for purposes of this revision.

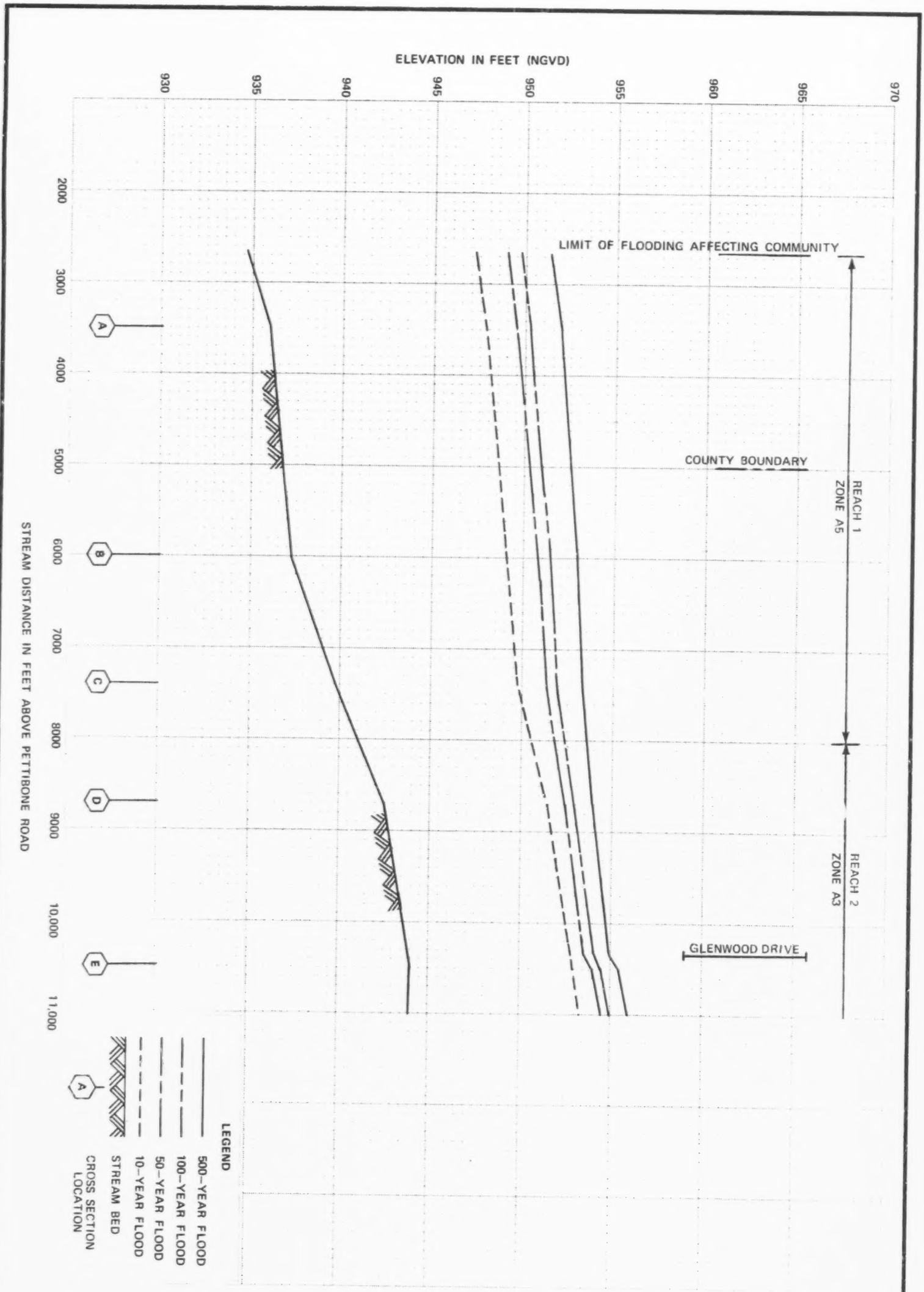
b. Scope

The Special Flood Hazard Areas along the entire reaches of two unnamed tributaries to Tinkers Creek were revised to reflect existing floodplain conditions. One tributary is located approximately 1,000 feet southeast of the intersection of Revenna Road and Depot Road. The flooding associated with this tributary is caused by backwater from Tinkers Creek. The Special Flood Hazard Area for this tributary was redelineated using a topographic map provided by the City of Twinsburg (Reference 14).

The other tributary is located south of the intersection of East Idlewood Drive and Ravenna Road. The Special Flood Hazard Area for this tributary was redelineated based on the existing topography, and the zone designation has been changed from Zone A to Zone B. This tributary was previously revised as such by a FEMA Letter of Map Revision dated August 27, 1987.

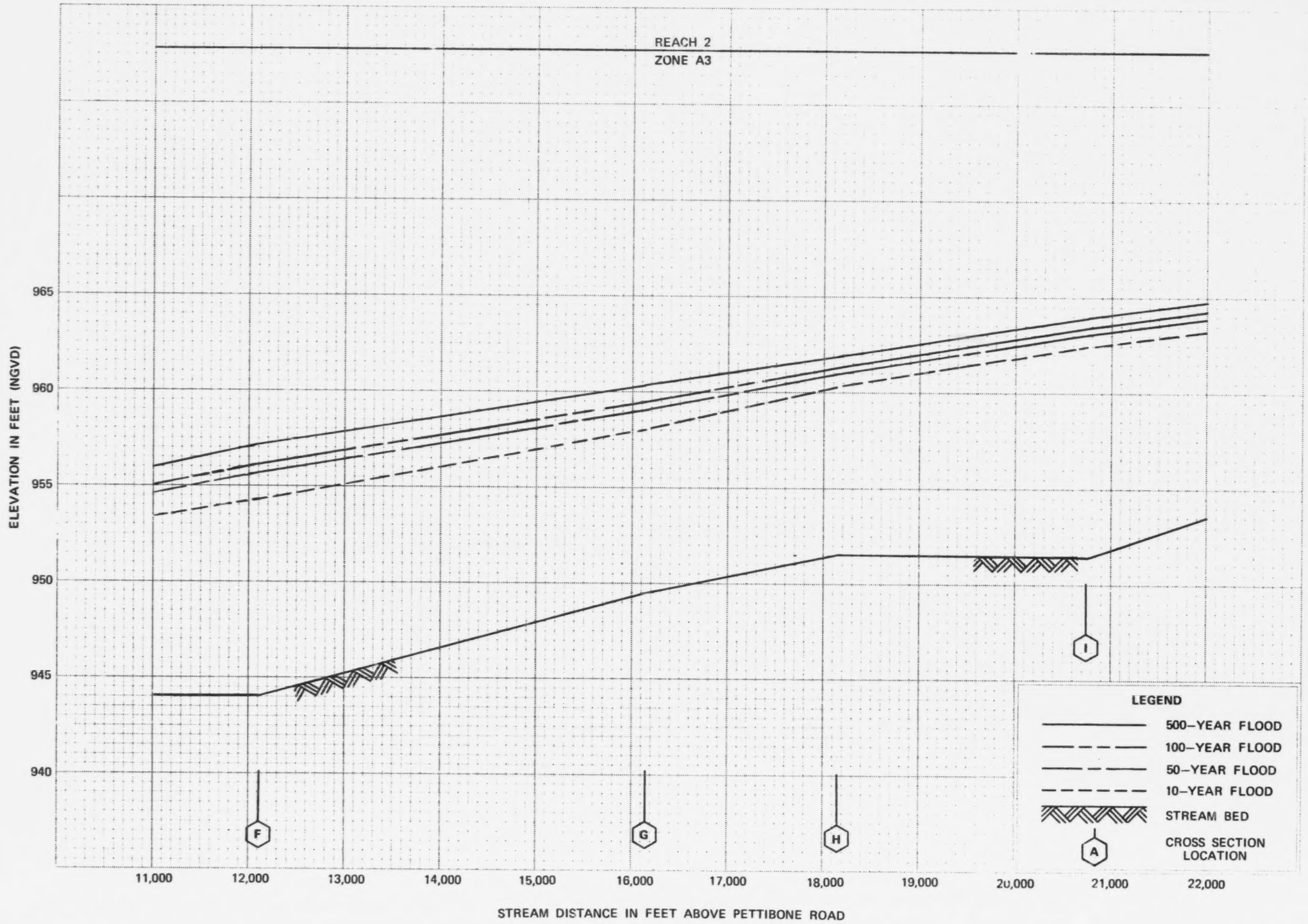
c. References and Bibliography

14. Consolo Construction and David Young/Architects, Route 14 Office and Mini Storage Center, Scale 1:360, Contour Interval 1 Foot: May 1986.



16

01P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF TWINSBURG, OH (SUMMIT CO.)	FLOOD PROFILES TINKERS CREEK



FLOOD PROFILES

TINKERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

02P

REACH 2
ZONE A3

DARROW ROAD

CANNON ROAD

ELEVATION IN FEET (NGVD)

975
970
965
960
955
950

22,000 23,000 24,000 25,000 26,000 27,000 28,000 29,000 30,000 31,000 32,000

STREAM DISTANCE IN FEET ABOVE PETTIBONE ROAD

J K L M N O

LEGEND

- 500–YEAR FLOOD
- 100–YEAR FLOOD
- 50–YEAR FLOOD
- 10–YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION (A)

FLOOD PROFILES

TINKERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

03P

REACH 2
ZONE A3

ELEVATION IN FEET (NGVD)

980
975
970
965
960

P
Q
R
S

32,000 33,000 34,000 35,000 36,000 37,000 38,000 39,000 40,000 41,000 42,000 43,000

STREAM DISTANCE IN FEET ABOVE PETTIBONE ROAD

LEGEND

500–YEAR FLOOD
100–YEAR FLOOD
50–YEAR FLOOD
10–YEAR FLOOD
STREAM BED
A — CROSS SECTION LOCATION

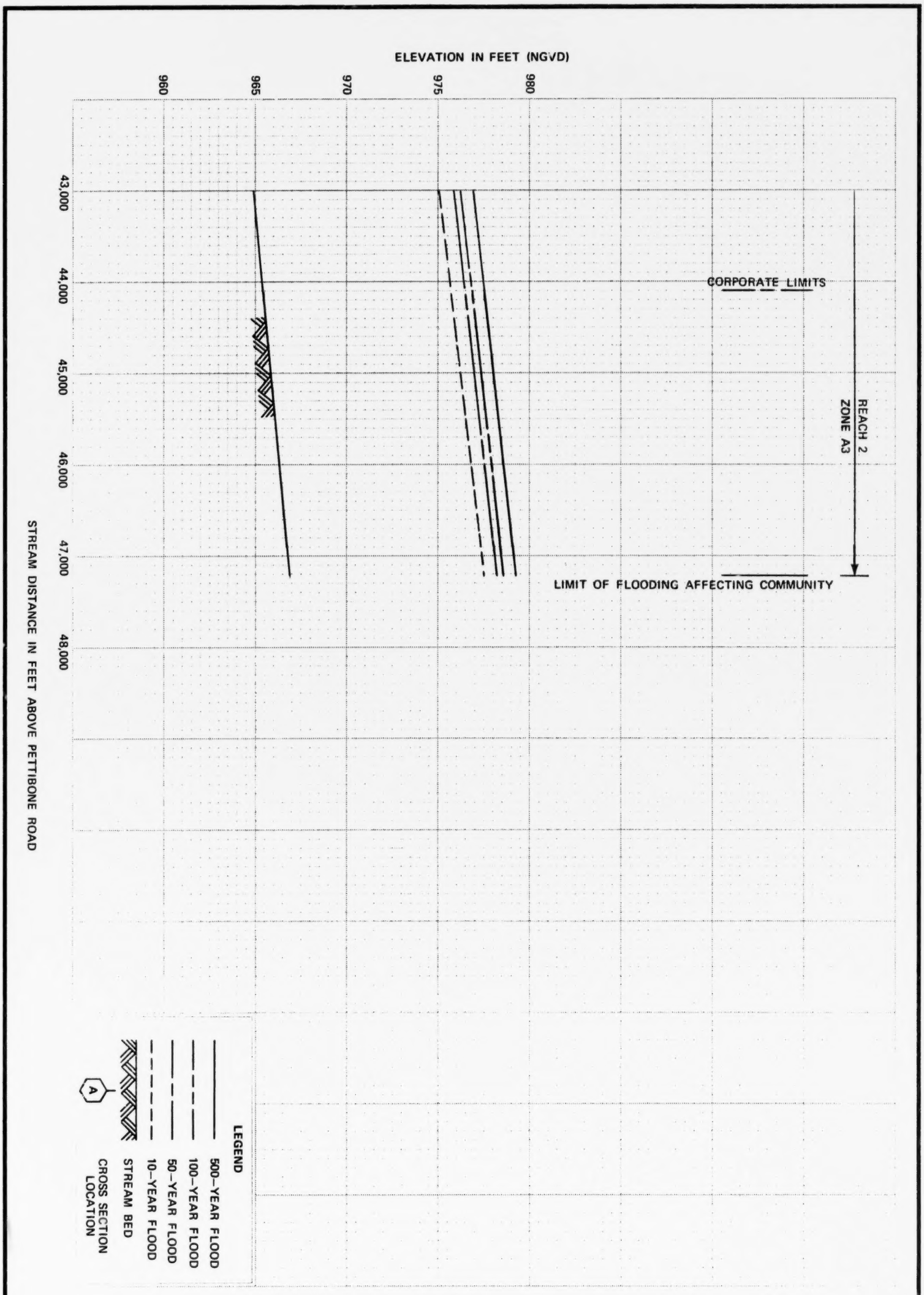
FLOOD PROFILES

TINKERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

04P



05P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF TWINSBURG, OH
(SUMMIT CO.)

FLOOD PROFILES

TINKERS CREEK